REPORT

Response Activities Summary Former Georgia-Pacific Corporation Mill Lagoons

Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

Prepared for Michigan Department of Environmental Quality

March 2000

BBL
BLASLAND, BOUCK & LEE, INC.

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Appendices

1. Overview

1.1 Background

This *Response Activities Summary, Former Georgia-Pacific Corporation Mill Lagoons* describes response activities performed under the draft Administrative Order by Consent (draft Consent Order) (Reference No. AOC-ERD-99-010) for the King Highway Landfill Operable Unit (KHL-OU) and the former Georgia-Pacific Corporation (Georgia-Pacific) Mill Lagoons (Mill Lagoons) of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site in Kalamazoo County, Michigan (Figure 1). This summary was prepared at the request of the Michigan Department of Environmental Quality (MDEQ).

The response activities were performed in accordance with the draft Statement of Work (draft SOW) for the Remedial Action (RA) set forth in the draft Consent Order. The purpose of the response activities for the Mill Lagoons was the removal of polychlorinated biphenyls (PCB)-containing soils and paper-making residuals (residuals) from the Mill Lagoons and consolidation of that material into the KHL-OU to achieve the industrial cleanup criteria for direct contact with soil of 9.9 milligrams per kilogram (mg/kg). The response activities also included the removal of PCB-containing soils, sediment, and paper residuals from the floodplain adjacent to the Mill Lagoons and consolidation of that material into the KHL-OU. The Mill Lagoons are situated on the Georgia-Pacific Kalamazoo Mill property northwest of KHL-OU (Figure 2).

1.2 Key Documents

Activities were performed in accordance with the following key documents:

- *Remedial Action Work Plan - Georgia-Pacific Mill Lagoons;*
- *KHL-OU Engineering Design Report* (EDR);
- *KHL-OU Erosion and Sedimentation Control Plan* (ESCP);
- *Remedial Action Turbidity Monitoring Plan*;
- *Remedial Action Air Monitoring Plan*;
- *Field Sampling Plan - KHL-OU;*
- *Quality Assurance Project Plan*;
- *Substantive Requirements Document;* and
- *King Highway Landfill Closure Construction Quality Assurance Plan.*

1.3 Key Facts

- Total area: approximately 182,000 square feet (ft^2):
  - — Lagoons 1, 2, 3, and 3A, and the floodplain area: approximately 110,200 ft^2;
  - — Lagoon 4: approximately 16,200 ft^2; and
  - — Lagoon 5: approximately 55,400 ft^2.

- The volume of materials removed at the Mill Lagoons was approximately 33,000 cy between November 1998 and September 1999 and approximately 5,000 cy from the floodplain area from July to September 1999.

2. Response Activities

2.1 Site Preparation

Site preparation activities consisted of the following:

- *Clearing and Grubbing* - Trees and stumps from the Mill Lagoons and from the floodplain area were tub-ground and transported to Cell 4 of the KHL-OU to stabilize excavated residuals.

- *Construction of Access Roads* - Approximately 1,500 linear feet of roads were built in October 1998 around the lagoons to connect the existing mill service roads to the lagoons. A truck turnaround and backfill staging area were also built.

- *Construction of Decontamination Station* - Working personnel, vehicles, and equipment underwent decontamination before leaving the work area. The personnel decontamination station was installed in October 1998. Approximately 10,000 gallons of wash water were collected, transported to the on-site treatment system, treated, and discharged to the Kalamazoo River, consistent with the *Substantive Requirements Document.*

- *Erosion and Sedimentation Controls* - Temporary control measures were implemented as prescribed in the EDR and ESCP included:

  — Installation of approximately 400 linear feet of silt fencing in October 1998 around the western perimeter of the excavation area; and

  — Installation of approximately 400 linear feet of silt curtains in June 1999 in the Kalamazoo River before excavation of the floodplain.

2.2 Excavation Activities

- Total area: approximately 182,000 ft^2.

  — Lagoons 1, 2, 3, and 3A, and the floodplain area: approximately 110,200 ft^2;
  — Lagoon 4: approximately 16,200 ft^2; and
  — Lagoon 5: approximately 55,400 ft^2.

- Approximately 33,000 cy was excavated from the Mill Lagoons between November 1998 and September 1999, and approximately 5,000 cy was excavated from the floodplain area from July to September 1999 (Figures 3 and 4).

- Excavation activities in the floodplain area consisted of materials being excavated to the edge of the river (approximately 753 feet above mean sea level [msl]). This response activity exceeded the requirements of the draft SOW, which described removal action based on 755 msl and a 10-foot buffer from the edge of the river (i.e., 755 msl) to the starting boundary of excavation.

- Several soil piles adjacent to Mill Lagoons 1, 2, and 3, as well as debris (e.g., concrete, drainage pipes, and shredded tree stumps) in the lagoons were removed and transported to Cell 4.

- The lagoons were excavated down to native soils to achieve the industrial cleanup criteria of 9.9 mg/kg or lower. The excavation of the floodplain area was considered an interim response action; therefore, the excavation activities in the floodplain were performed using visual cleanup criteria only.

- During excavation, one area was discovered to contain drums. Ten drums were found in November 1998 at the eastern limits of Mill Lagoon 1. Drums containing free liquids were overpacked, and the drums were placed into a roll-off for off-site disposal. Results of laboratory analysis of materials contained in the drums are presented in Appendix A. The data indicate the material was nonhazardous.

- Two clarifiers were discovered at the east end of Lagoon 1 in December 1998. The contents were removed, and the clarifiers were backfilled with approved clean material.

- Excavated materials were gravity-dewatered, as necessary, transported, and stabilized (mixed with fly ash and wood chips).

- Water from excavation activities was pumped to the on-site water treatment system. The water was treated, sampled, and stored in frac tanks until analytical results indicated that discharge was appropriate in accordance with the *Substantive Requirements Document.*

2.3 Site Restoration

- Following removal of residuals and analysis of verification samples, the excavation areas were backfilled using an approved imported clean backfill material followed by 6 inches of topsoil and hydroseed.

  — Mill Lagoons 1 through 3A were backfilled, topsoiled, and hydroseeded in August 1999.
  — Mill Lagoon 4 was backfilled in June 1999 and topsoiled and hydroseeded in early August 1999.
  — Mill Lagoon 5 was backfilled, topsoiled, and hydroseeded by November 1999.
  — The floodplain area was backfilled in August 1999 and hydroseeded in November 1999.

- Approximately 400 feet of riprap, 5 feet wide and 6 inches thick, on top of geotextile was placed along the Kalamazoo River. Riprap will serve as a permanent form of erosion and sedimentation control and was placed to protect the regraded soils from river-induced erosive forces.

3. Environmental Monitoring and Verification Sampling and Analysis

3.1 Environmental Monitoring

Environmental monitoring was conducted throughout the remediation activities and included:

- Dust Monitoring

  — Dust monitoring was conducted during remediation activities and consisted of both a visual inspection of the site and dust monitoring via a Mini-Ram dust monitor. Dust monitoring data are included in Appendix B.

  — The criterion for suspended particulates was set at 150 micrograms per cubic meter ($\mu g/m^3$) in compliance with the National Ambient Air Quality Standard (NAAQS).

  — When the criterion was exceeded, dust control measures were instituted in compliance with the *Remedial Action Work Plan - Georgia-Pacific Mill Lagoons*. These measures included limited watering on source areas (e.g., roads, excavation faces), maintaining slower vehicle traffic on dirt roads, and/or terminating daily activities until the situation was corrected.

- Air Monitoring

  — As prescribed in the *Remedial Action Work Plan - Georgia-Pacific Mill Lagoons*, air monitoring was performed throughout construction activities at the three locations shown on Figure 2. The action levels were set at 0.2 $\mu g/m^3$ for the north and southwest monitoring locations and 0.02 $\mu g/m^3$ for the southeast monitoring location.

  — Samples were collected daily during remediation activities at the Mill Lagoons and floodplain.

  — A total of 362 air samples were collected and analyzed for PCB; eight samples resulted in PCB concentrations that exceeded the action level (Table 1). The MDEQ was notified of any PCB detections as a result of monitoring, and engineering controls were implemented.

— Laboratory results of air monitoring are included in Appendix C.

— Meteorological data associated with air quality are found in Appendix D.

- As prescribed in the *Remedial Action Turbidity Monitoring Plan* (BBL, July 1999), measurements of turbidity were made in the Kalamazoo River approximately 100 feet upstream and 100 feet downstream of the work area; water samples were collected at mid-depth from the same two locations (Figure 2). Turbidity monitoring was conducted in July and August 1999, consisting of six upstream and six downstream turbidity measurements. All results were below the prescribed 25% variance for the full extent of the remedial activities and are summarized in Table 2.

- Twelve surface water samples taken in July and August 1999 were analyzed for PCB, with all results below both the MDEQ Target Detection Limit of 0.2 micrograms per liter (µg/L) and the laboratory detection limit of 0.1 µg/L. The analytical results are included in Appendix E.

3.2 Verification Sampling and Analysis

Mill Lagoons

- Verification sampling was conducted at the Mill Lagoons on the floor and sidewalls of the excavation. The industrial cleanup criteria for direct contact with soil of 9.9 mg/kg was used. Verification sampling frequency and sample locations were determined based on the *Guidance Document for Verification of Soil Remediation* (MDNR, 1994). Samples were collected from 0 to 0.5 feet below the limit of excavation.

- Samples from Mill Lagoons 1, 2, 3, 4, and 5 were collected and submitted for laboratory analysis at KAR Laboratories, Inc. (KAR) in Kalamazoo, Michigan. PCB analyses were performed using SW-846 Method 8082.

- Samples from Mill Lagoon 3A were collected and tested using an EnSys field test kit (Appendix F). Three samples collected from Mill Lagoon 3A were submitted for analysis at Savannah Laboratories and Environmental Services, Inc. (Savannah Laboratories) located in Savannah, Georgia. PCB analysis was performed using SW-846 Method 8082.

- Fourteen verification samples (G52057 through G52070) were collected from Mill Lagoons 1, 2, and 3 (Figure 3) in July and August 1999. All soil samples were below the cleanup criteria. The arithmetic mean PCB concentration and 95% Upper Confidence Level (UCL) were 0.23 mg/kg and 0.30 mg/kg, respectively. A summary of the analytical laboratory results for the verification samples and statistical analysis is provided in Table 3.

- Three verification samples (1, 3, and 10) with one duplicate sample (10D) were collected at Mill Lagoon 3A (Figure 3). Two samples (8 and 11) were collected as requested by the MDEQ, and two samples (TP and DS) were collected as requested by BBL. Three samples (11, TP, and DS) failed the EnSys PCB field test kit screening level of 9.2 mg/kg. Areas around these sample locations were reexcavated. Results are presented in Table 4.

- Three samples (TP and two locations along the south sidewall near the railroad tracks) were analyzed by Savannah Laboratories with results of 6.5, 38, and 12 mg/kg, respectively. Areas around these sample locations were reexcavated.

- Fourteen verification samples (G52043 through G52056) were collected in June 1999 from Mill Lagoon 4 (Figure 4). Analytical results for these samples were below the cleanup criteria, with the exception of one sample (G52048); this location was reexcavated. Excluding sample G52048, the arithmetic mean PCB concentration and 95% UCL were 0.83 mg/kg and 2.1 mg/kg, respectively. A summary of the results and statistical analysis is provided in Table 5.

- Fifteen verification samples (G52080 through G52094) were collected in August 1999 from Mill Lagoon 5 (Figure 4). Of these samples, one sample along the northwest sidewall (G52092) had a PCB concentration above the cleanup criteria. An area around this sample location was reexcavated. With the exclusion of this sample, the arithmetic mean concentration and 95% UCL within Mill Lagoon 5 were 0.35 and 0.59 mg/kg, respectively. Analytical laboratory results for the verification samples are summarized in Table 6.

- Nine additional verification samples (G52071 through G52079) were collected in August 1999 at the request of the MDEQ along the west sidewall of Mill Lagoon 5. Seven of the nine samples had PCB concentrations above the cleanup criteria. PCB concentrations ranged from 1.9 to 170 mg/kg. Analytical laboratory results for these verification samples are summarized in Table 6.

- Due to the results of the verification sampling at Mill Lagoon 5, a reexcavation and extension of the western portion of the lagoon was conducted. Four verification samples were collected along the reexcavated west sidewall in September 1999 (G52099 through G52102) (Figure 4), with results showing no detections above the cleanup criteria. The results are summarized in Table 7.

- Based on oral reporting of results of MDEQ sampling (Table 8), additional excavations were conducted at the Mill Lagoons (Figure 3). The analytical results of verification sampling (G52095, G52096, and G52103 through G52107) conducted upon reexcavation in September 1999 indicated that the samples collected were below the cleanup criteria. Results are summarized in Table 7.

- In accordance with the *Remedial Action Work Plan - Georgia-Pacific Mill Lagoons*, verification samples G52108 through G52111 (Figure 3) from Mill Lagoons 1, 2, 3, and 4 and G52080 and G52085 (Figure 4) from Mill Lagoon 5 were analyzed for the U.S. Environmental Protection Agency Contract Laboratory Program Target Compound List/Target Analyte List (TCL/TAL) constituents. The analytical results for detected TCL/TAL constituents by sample are summarized in Table 9.

- Blasland, Bouck & Lee, Inc. (BBL) field and laboratory results are included in Appendix F. MDEQ soil verification laboratory results are included in Appendix G.

Floodplain

- Removal in this area was an interim response action, and excavation was based on a visual criteria only; therefore, verification sampling was not conducted by BBL.

- Postexcavation sampling (ML SW N-1 through ML SW -E-17) was conducted by the MDEQ. According to oral reporting of results provided by the MDEQ, areas within the floodplain area had sampling results with PCB concentrations greater than 9.9 mg/kg (Figure 3). These locations were reexcavated in September 1999. The location within the Georgia-Pacific property was reexcavated and sampled (G52098) with results showing no detections above the cleanup criteria. Results are summarized in Table 7. The location north of the Georgia-Pacific property was also excavated. Due to the proximity of the Kalamazoo River, the area was backfilled immediately after excavation. Reexcavations included the removal of all visible residuals.

Tables

Table 1

Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Response Activities Summary
Former Georgia-Pacific Corporation Mill Lagoons

Summary of Air Monitoring Detections

Sample Date	Sample ID	Concentration ($\mu g/m^3$)
7/22/99	H2P024	0.02
7/23/99	H2P025	0.03
7/26/99	H2P027	0.02
8/30/99	H2P049	0.03
9/15/99	H2P060	0.02
9/17/99	H2P062	0.02
9/24/99	H2P067	0.02
9/28/99	H2P070	0.03

Note:
1. The MDEQ was notified of any PCB detections as a result of monitoring, and engineering controls were implemented.

Table 2

Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Response Activities Summary
Former Georgia-Pacific Corporation Mill Lagoons

Summary of Turbidity Monitoring

Date	Location	Total Water Depth (ft)	Turbidity (NTU)	% Difference[3]
7/14/99	D[1]	3	20	
7/14/99	U[2]	4	20	0
7/15/99	D	3	18	
7/15/99	U	4	18	0
7/16/99	D	3	18	
7/16/99	U	4	18	0
7/17/99	D	3	18	
7/17/99	U	4	17	6
7/30/99	D	4	18	
7/30/99	U	4	19	-5
8/02/99	D	4	20	
8/02/99	U	4	19	5

Notes:
[1] D = Monitoring was conducted approximately 100 feet downstream of remedial activities
[2] U = Monitoring was conducted approximately 100 feet upstream of remedial activities
[3] % Difference – Relative percent difference between the upstream and downstream turbidity results

Table 3

Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Response Activities Summary
Former Georgia-Pacific Corporation Mill Lagoons

Summary of PCB Soil Verification Sampling for
Mill Lagoons 1, 2, and 3

Sample ID	Sample Date	Total PCB (mg/kg)[1]
G52057	7/22/99	< 0.33
G52058	7/22/99	< 0.33
G52059	7/22/99	< 0.33
G52060	7/22/99	< 0.33
G52061	7/28/99	< 0.33
G52062	7/28/99	< 0.33
G52063	7/28/99	< 0.33
G52064	7/28/99	< 0.33
G52065	7/28/99	< 0.33
G52066	8/5/99	0.58
G52067	8/5/99	< 0.33
G52068	8/5/99	0.44
G52069	8/5/99	0.37
G52070	8/5/99	< 0.33
	Mean	0.23
	Standard Deviation	0.13
	95% UCL	0.30

Notes:
[1] One-half of the detection limit was used in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

Table 4

Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Response Activities Summary
Former Georgia-Pacific Corporation Mill Lagoons

Soil Verification Sampling EnSys® Field Test Kit Results for
Mill Lagoon 3A

Sample ID	Soil Description	50 mg/kg Test	9.2 mg/kg Test
1	Brown fine to medium grained sand	Pass	Pass
3	Light brown fine to medium grained sand	Pass	Pass
8	Brown fine to medium grained sand and clay	Fail	Pass
10	Brown fine to medium grained sand	Pass	Pass
10 duplicate	Brown fine to medium grained sand	Pass	Pass
11	Gray medium to course grained sand	Fail	Fail
TP	Gray brittle clay	Fail	Fail
DS	Gray brittle clay	Fail	Fail

Note:
1. Areas that failed the 9.2 mg/kg test were reexcavated.

Table 5

Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Response Activities Summary
Former Georgia-Pacific Corporation Mill Lagoons

Summary of PCB Soil Verification Sampling for
Mill Lagoon 4

Sample ID	Sample Date	Total PCB (mg/kg)[1]
G52043	6/2/99	< 0.33
G52044	6/2/99	7.9
G52045	6/2/99	< 0.33
G52046	6/2/99	< 0.33
G52047	6/2/99	< 0.33
G52048	6/2/99	12
G52049	6/2/99	< 0.33
G52050	6/2/99	< 0.33
G52051	6/2/99	1.0
G52052	6/2/99	< 0.33
G52053	6/2/99	< 0.33
G52054	6/2/99	< 0.33
G52055	6/2/99	< 0.33
G52056	6/2/99	< 0.33
	Mean	0.83
	Standard Deviation	2.1
	95% UCL	2.1

Notes:
[1] One-half of the detection limit was used in the calculation of the arithmetic mean, standard deviation, and 95% UCL. (Sample G52048 was excluded from the calculations due to reexcavation from this area.)

Table 6

Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Response Activities Summary
Former Georgia-Pacific Corporation Mill Lagoons

Summary of PCB Soil Verification Sampling for Mill Lagoon 5

Sample ID[1,2]	Sample Date	Total PCB (mg/kg)[3,4]
G52071	8/31/99	23
G52072	8/31/99	18
G52073	8/31/99	1.9
G52074	8/31/99	170
G52075	8/31/99	11
G52076	8/31/99	23
G52077	8/31/99	39
G52078	8/31/99	99
G52079	8/31/99	6.1
G52080	8/31/99	0.69
G52081	8/31/99	< 0.33
G52082	8/31/99	0.41
G52083	8/31/99	< 0.33
G52084	8/31/99	< 0.33
G52085	8/31/99	< 0.33
G52086	8/31/99	< 0.33
G52087	8/31/99	< 0.33
G52088	8/31/99	< 0.33
G52089	8/31/99	< 0.33
G52090	8/31/99	< 0.33
G52091	8/31/99	< 0.33
G52092	8/31/99	120
G52093	8/31/99	1.7
G52094	8/31/99	0.35
	Mean	0.35
	Standard Deviation	0.42
	95% UCL	0.59

Notes:
[1] Sample IDs G52080 through G52094 were unbiased samples.
[2] Sample IDs G52071 through G52079 were biased samples.
[3] One-half the detection limit was used in the calculation of the arithmetic mean, standard deviation, and 95% UCL.
[4] Calculation of the arithmetic mean, standard deviation, and 95% UCL included sample IDs G52080 through G52091, G52093, and G52094 (exclusion of samples G52071 through G52079 and G52092 were the result of reexcavation).

Table 7

Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Response Activities Summary
Former Georgia-Pacific Corporation Mill Lagoons

Summary of PCB Soil Verification Sampling for
Reexcavated Areas for Mill Lagoons 1, 2, 3, and 5

Sample ID[1,2,3]	Sample Date	Total PCB (mg/kg)
G52095	9/16/99	< 0.33
G52096	9/16/99	0.67
G52097	9/16/99	< 0.33
G52098	9/16/99	< 0.33
G52099	9/16/99	< 0.33
G52100	9/16/99	< 0.33
G52101	9/16/99	< 0.33
G52102	9/16/99	1.1
G52103	9/23/99	0.66
G52104	9/23/99	2.6
G52105	9/23/99	< 0.33
G52106	9/23/99	< 0.33
G52107	9/23/99	< 0.33

Notes:

[1] Samples G52095 through G52098 were collected from Mill Lagoons 1, 2, and 3 reexcavation pits.

[2] Samples G52099 through G52102 were collected from Mill Lagoon 5 reexcavation of the west wall.

[3] Samples G52103 through G52107 were collected from Mill Lagoon 2 reexcavation pit.

Table 8

Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Response Activities Summary
Former Georgia-Pacific Corporation Mill Lagoons

Summary of MDEQ PCB Soil Verification Sampling Results for
Mill Lagoons 1, 2, 3, and 3A

Sample ID	Sample Date	Total PCB (mg/kg)[1]
ML SW N-1	8/3/99	280[2]
ML SW N-2	8/3/99	13
ML SW N-3	8/3/99	2.9
ML L-1-4	8/3/99	2.5
ML SW N-5	8/3/99	1.3
ML OF-6	8/3/99	16[2]
ML OF-7	8/3/99	28[2]
ML FP-8	8/3/99	7.0
ML L-1-9	8/3/99	0.40
ML L-2-10	8/3/99	0.076
ML L-3-11	8/3/99	1.6[2]
ML L-3-12	8/3/99	17[2]
ML FP-13	8/3/99	41[2]
ML L-3-14	8/3/99	2.2
ML SW-E-15	8/3/99	2.4
ML SW-E-16	8/3/99	<0.025
ML SW-E-17	8/3/99	19[2]
	Mean	3.2
	Standard Deviation	4.0
	95% UCL	6.1

Notes:
[1] One half the detection limit was used in the calculation of the mean, standard deviation, and 95% UCL.
[2] Calculation of the arithmetic mean, standard deviation, and 95% UCL excluded samples ML SW N-1, ML OF-6, ML OF-7, ML L-3-11, ML L-3-12, ML FP-13, and ML SW-E-17 due to reexcavation.

Table 9

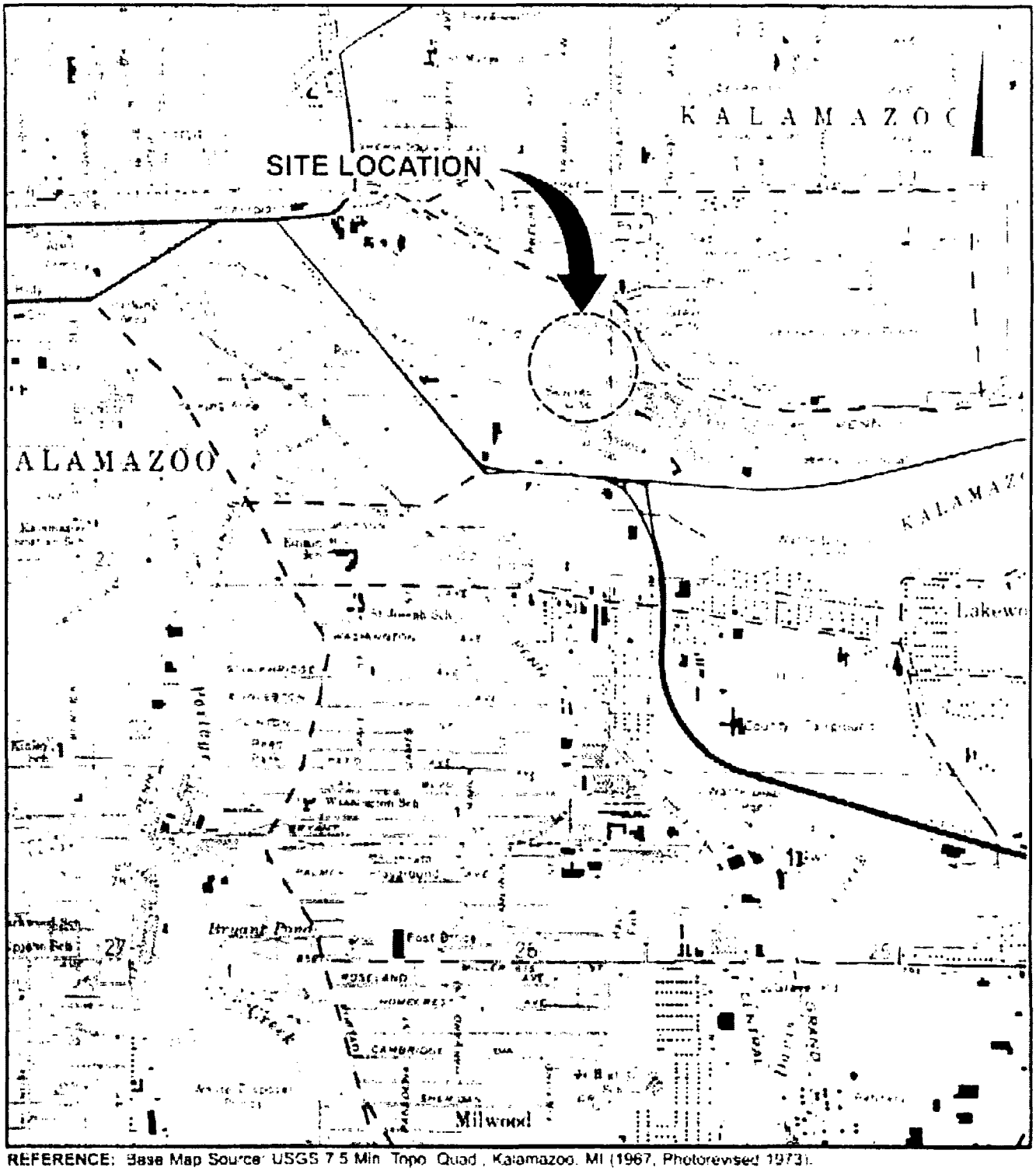
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Response Activities Summary
Former Georgia-Pacific Corporation Mill Lagoons

Sample-Specific Detected TCL/TAL Concentrations

Compound/ Analyte	Sample G52080	Sample G52085	Sample G52108	Sample G52109	Sample G52110	Sample G52111
TCL- SVOC						
Benzo(a)anthracene	< 0.33	< 0.33	1.3	< 0.33	< 0.33	2.5
Benzo(a)pyrene	< 0.33	< 0.33	2.1	< 0.33	< 0.33	2.1
Benzo(b)fluoranthene	< 0.33	< 0.33	4.0	< 0.33	< 0.33	4.5
Benzo(k)fluoranthene	< 0.33	< 0.33	2.0	< 0.33	< 0.33	2.0
Chrysene	< 0.33	< 0.33	2.1	< 0.33	< 0.33	2.4
Fluoranthene	< 0.33	0.36	4.4	0.49	< 0.33	3.5
2-Methylnaphthalene	< 0.33	< 0.33	1.5	< 0.33	< 0.33	< 1.0
Phenanthrene	< 0.33	< 0.33	1.8	< 0.33	< 0.33	1.5
Pyrene	< 0.33	< 0.33	4.9	0.49	< 0.33	9.4
TAL- Metals/Other Compounds						
Aluminum	2,500	2,100	3,300	2,900	2,800	3,800
Antimony	1.9	0.81	1.4	< 0.50	< 0.50	1.6
Arsenic	3.9	7.9	27	4.4	3.2	15
Barium	50	28	92	32	28	88
Beryllium	0.30	0.46	0.65	0.22	0.28	0.83
Cadmium	0.42	0.33	0.75	0.44	0.30	0.74
Calcium	73,000	22,000	20,000	32,000	32,000	13,000
Chromium[1]	9.0	4.0	12	10	7.6	16
Cobalt	3.0	3.4	3.7	2.4	2.8	5.0
Copper	52	21	37	19	15	55
Cyanide	0.50	0.20	0.50	< 0.20	< 0.20	0.50
Iron	5,700	6,600	15,000	6,400	6,500	18,000
Lead	56	25	6.0	16	13	91
Magnesium	4,900	4,200	3,900	7,100	7,700	2,800
Manganese	150	130	340	200	16	29
Mercury[1]	0.00030	< 0.0001	0.16	< 0.10	< 0.10	0.24
Nickel	5.0	8.0	10	7.0	7.0	14
Potassium	340	320	330	360	380	310
Selenium	0.60	< 0.20	1.5	< 0.20	0.50	2.6
Sodium	190	97	170	65	70	110
Vanadium	11	11	14	18	12	21
Zinc	86	51	130	28	27	200

Notes:
[1] Chromium and mercury are each reported as total, low-level, respectively.

Figures



REFERENCE: Base Map Source: USGS 7.5 Min. Topo. Quad., Kalamazoo, MI (1967, Photorevised 1973).

2000' 0 2000'

APPROXIMATE SCALE 1" = 2000'

AREA LOCATION

ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER SUPERFUND SITE

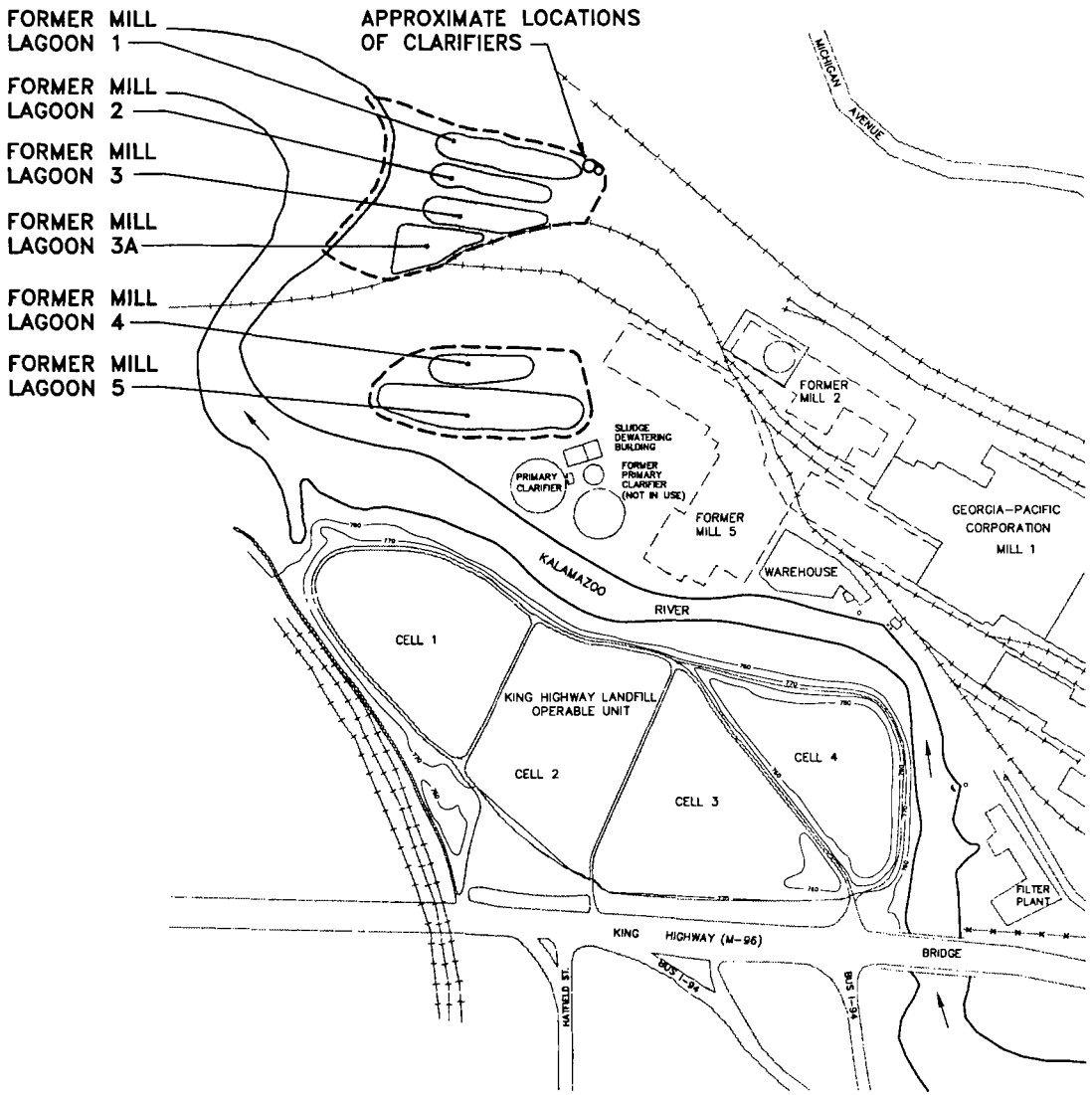
RESPONSE ACTIVITIES SUMMARY

FORMER GEORGIA-PACIFIC CORPORATION MILL LAGOONS

SITE LOCATION MAP

BBL BLASLAND, BOUCK & LEE, INC.

FIGURE 1



LEGEND

- RAILROAD TRACKS
- LOCATION OF CURRENT STRUCTURES
- FENCE
- RIVER FLOW DIRECTION
- APPROXIMATE LOCATION OF REMEDIAL ACTIVITIES
- APPROXIMATE LOCATION OF AIR MONITORING STATION
- PCB ACTION LEVELS

NOTES:

1. BASE MAP INFORMATION IS APPROXIMATE AND IS BASED ON MAPPING PROVIDED BY MICHIGAN DEPARTMENT OF NATURAL RESOURCES, MAPPING DIGITIZED FROM AERIAL PHOTOGRAPHS, AND VARIOUS MEASUREMENTS AND SURVEYS PERFORMED BY BLASLAND, BOUCK, & LEE, INC.
2. WATER MONITORING LOCATIONS CHANGED DAILY BASED ON LOCATION OF EXCAVATION ACTIVITIES.

300' 0 300'

APPROXIMATE SCALE: 1" = 300'

ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER SUPERFUND SITE

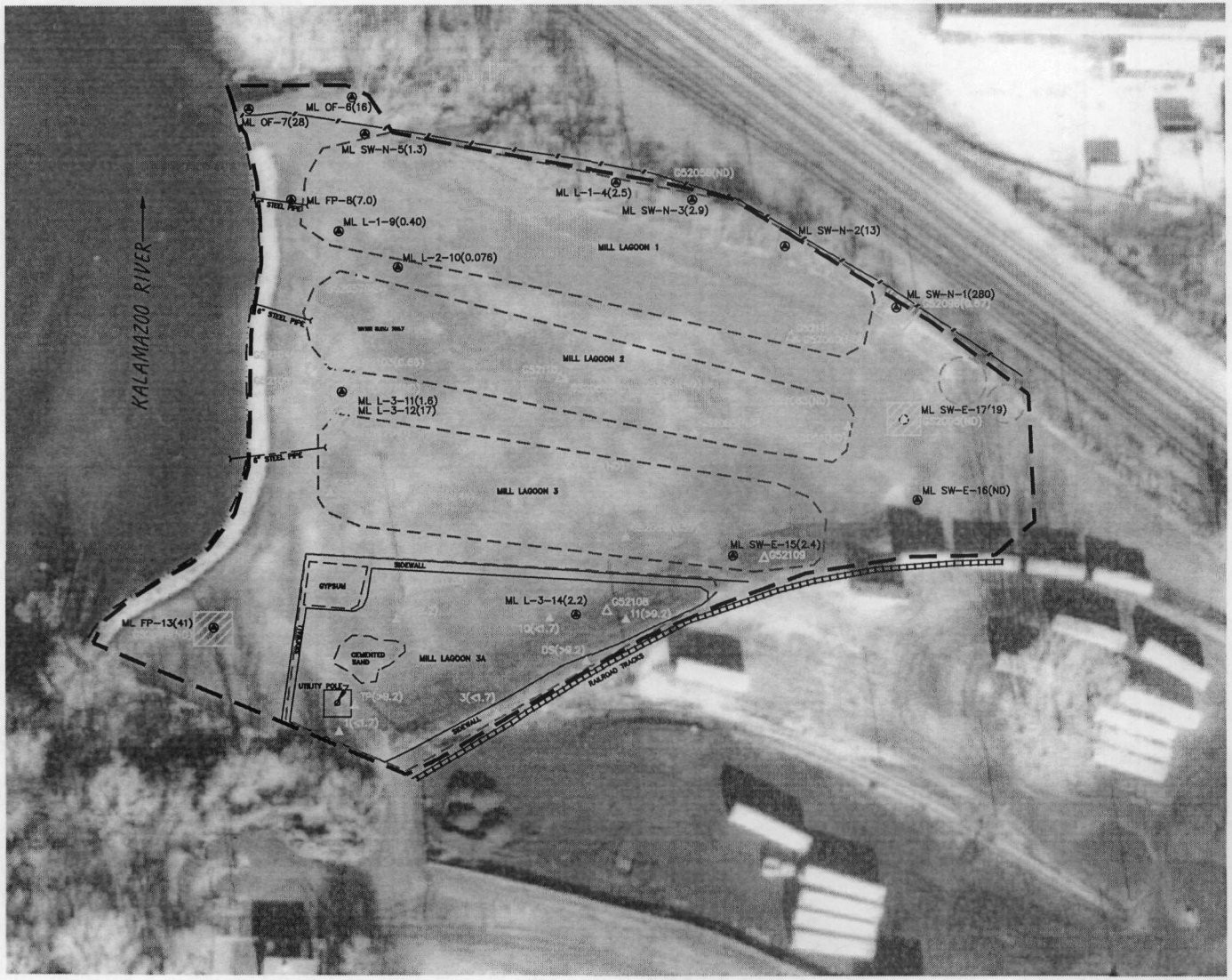
RESPONSE ACTIVITIES SUMMARY
FORMER GEORGIA-PACIFIC CORPORATION MILL LAGOONS

PROJECT LOCATION AND ENVIRONMENTAL MONITORING LOCATIONS

BBL BLASLAND, BOUCK & LEE, INC. engineers & scientists

FIGURE 2

L: ON=*; OFF=ACCESS*,*REF*
P: STD-PCP/BL
2/21/00 SYR-54-KLN GMS YCC
64585040/64585G02.DWG



LEGEND

- EXISTING FENCE LINE
- APPROXIMATE LIMIT OF LAGOON
- APPROXIMATE LOCATION OF BURIED CLARIFIERS
- FLOW DIRECTION
- APPROXIMATE RIVER EDGE
- EXISTING RAILROAD TRACKS
- G52108 — APPROXIMATE LOCATION OF SOIL SAMPLES ANALYZED FOR PCB
- G52109 — APPROXIMATE LOCATION OF SOIL SAMPLES ANALYZED FOR TAL/TCL
- ML-L1-4 — APPROXIMATE LOCATION OF SOIL SAMPLE COLLECTED BY MDEQ
- LIMIT OF EXCAVATION ACTIVITIES
- APPROXIMATE AREAS OF REEXCAVATION
- (0.37) — PCB CONCENTRATION IN mg/kg
- (ND) — NON-DETECT
- (<1.7) — PCB CONCENTRATION LESS THAN 1.7 mg/kg
- (>9.2) — PCB CONCENTRATION GREATER THAN 9.2 mg/kg
- (<9.2) — PCB CONCENTRATION LESS THAN 9.2 mg/kg BUT GREATER THAN 1.7 mg/kg

NOTES:

1. BASE MAP INFORMATION OBTAINED FROM CADD DRAWING FILE DEVELOPED BY ATWELL-HICKS, INC., ANN ARBOR, MICHIGAN (CADD FILE: 29957S01; DWG TITLE: TOPOGRAPHIC SURVEY, KING HIGHWAY LANDFILL; DWG DATED: 3-21-97; DWG SCALE: 1"=20'.). AERIAL PHOTOGRAPH DATED 12-8-99.
2. LOCATIONS ARE APPROXIMATE.
3. SITE FEATURES IN MILL LAGOON 3A, ARE BASED ON A FIELD SKETCH. (LOCATIONS ARE VERY APPROXIMATE)
4. SAMPLES IN MILL LAGOON 3A WERE ANALYZED USING AN ENSYS FIELD TEST KIT SET TO TEST FOR PCB CONCENTRATIONS ABOVE OR BELOW 1.7 AND 9.2 mg/kg.

0 60' 120'

GRAPHIC SCALE

ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER SUPERFUND SITE

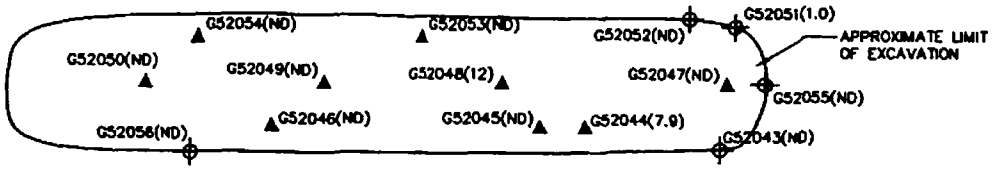
RESPONSE ACTIVITIES SUMMARY
FORMER GEORGIA-PACIFIC CORPORATION
MILL LAGOONS

VERIFICATION SAMPLING LOCATIONS
MILL LAGOONS 1, 2, 3, AND 3A

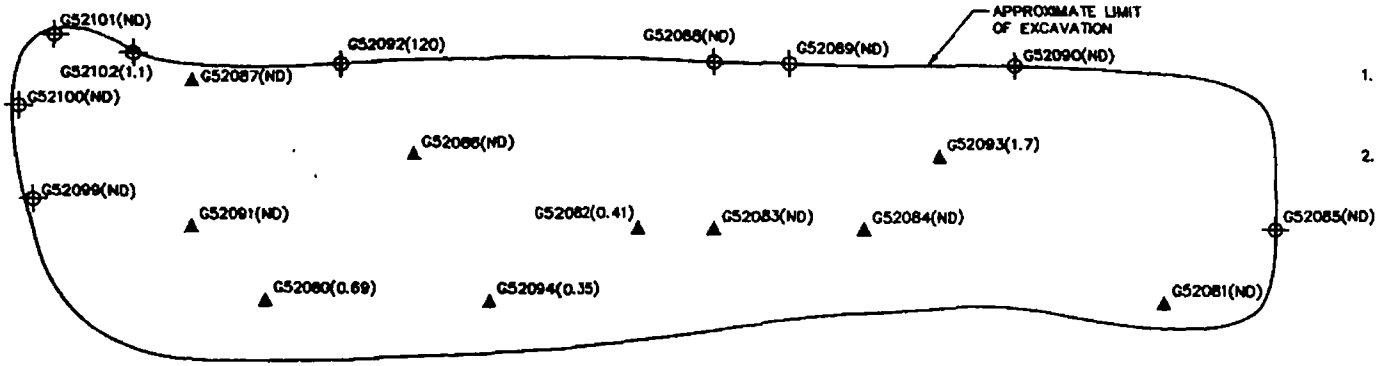
BBL BLASLAND, BOUCK & LEE, INC. *engineers & scientists*

FIGURE 3

X: 64585X01.DWG
L: ON=*, OFF=REF
P: KALAM.PCP
2/21/00 SYR-54-RCB GMS YCC
64585040/64585B01.DWG



MILL LAGOON 4



MILL LAGOON 5

LEGEND:

- ⊕ APPROXIMATE LOCATION OF SIDE WALL SOIL SAMPLE
- ▲ APPROXIMATE LOCATION OF BASE OF EXCAVATION SOIL SAMPLE
- (7.9) PCB CONCENTRATION IN mg/kg
- (ND) NON-DETECT

NOTES:

1. SAMPLE LOCATIONS ARE APPROXIMATE. LIMITS OF EXCAVATION ARE BASED ON FIELD MEASUREMENTS COLLECTED BY BLASLAND, BOUCK & LEE, INC. PERSONNEL.
2. SAMPLE LOCATION G52087 WAS REEXCAVATED BUT NOT RESAMPLED.

ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER SUPERFUND SITE
RESPONSE ACTIVITIES SUMMARY
FORMER GEORGIA-PACIFIC CORPORATION
MILL LAGOONS

VERIFICATION SAMPLING LOCATIONS
MILL LAGOONS 4 AND 5

BBL BLASLAND, BOUCK & LEE, INC. engineers & scientists

FIGURE 4